Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL DESIGN REPORT

Concrete Safety Barrier at State Route 78
And West Vista Way
Between College Boulevard and Melrose Drive

11/SD/78
PM 3.3 / 5.8/
11-294501
1100000387

September 3, 2010

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California Business, Transportation and Housing Agency

Memorandum

To: Mr. Richard Estrada
District 11
Senior Transportation Engineer

Date: September 3, 2010

File: 11-SD-78-PM 3.3/5.8
EA 11-294501
1100000387

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Geotechnical Design Report for the Concrete Safety Barrier at State Route 78 and West Vista Way

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Geotechnical Design Report for the Proposed Concrete Safety Barrier at State Route 78 and West Vista Way. This report defines the geotechnical conditions as evaluated from field data and used in the development of the geotechnical design. It provides recommendations and specifications for project design and construction.

OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Ali Lari at (858) 467-6922.

Ali Lari
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

cc: Abbas Abghari
Brian Hinman
Richard Estrada
Levy Le (RE Pending File)
Bethnay Des Jardins
Mark Willian
Art Padilla
File

1.0 EXECUTIVE SUMMARY

Pursuant to the recommendations contained in this report the proposed concrete safety barriers may be constructed using Standard Plan Type 60 and Type 736SV Barrier. These recommendations are presented in detail within this report and may be used for project design and construction.

2.0 INTRODUCTION

Pursuant to your request, Caltrans Office of Geotechnical Design South 2 has provided this Geotechnical Design Report to be used for project design and construction. The proposed project involves construction of two concrete safety barriers between westbound State Route 78 (SR-78) and the adjacent frontage road (West Vista Way) from College Boulevard to Melrose Drive, and one concrete safety barrier between eastbound SR-78 and adjacent frontage roads (Plaza/Hacienda Drive) from College Boulevard to Emerald Drive. Due to the variable grade difference between the freeway and frontage roads, it will be necessary to construct portions of the barriers on pile foundations. The proposed project location is shown on the site plan presented in Figure 1.

3.0 EXISTING FACILITIES.

SR-78 is a six-lane freeway, connecting Interstate 5 (I-5) and Interstate 15 (I-15). East of I-15, SR-78 continues as a two-lane highway to Imperial County and onward to the border of California and Arizona. West Vista Way is adjacent to westbound SR-78 between I-5 and Melrose Drive. Plaza Drive and Hacienda Drive are the frontage roads adjacent to eastbound SR-78. The site plan shows the proposed concrete safety barrier alignments relative to the SR-78 freeway and frontage roads.

4.0 PHYSICAL SETTING

The project lies within a transitional zone of interior inland influence and oceanic influence. The winters are mild and wet and the summers are moderate and dry. The mean yearly rainfall in the project area is 13 inches. Rainfall usually occurs between the months of November and April. Rare tropical storms during summer months can deliver short, intense downpours.

Within the project area the freeway alignment profile is generally level. The topography is hilly to the north with a stream valley to the south. The general drainage trend is from north to south.

Beyond the right-of-way and along the freeway frontage roads the area is moderately to densely developed with residential and light commercial properties. Some agricultural land and open space buffers still exist along the freeway.

There are no man-made or natural features that present any unusual engineering or construction challenges.

5.0 SITE INVESTIGATION

The following subsections describe the investigation conducted for this report:

5.1 Pertinent Reports and Archives Review

1) Soil and Foundation Information Provided in Advance of the District Preliminary Geotechnical Report for Concrete Safety Barrier by OGDS2 dated February 11, 2009.

2) District Preliminary Geotechnical Report for Concrete Safety Barrier by OGDS2 dated March 5, 2009.

3) Revision of District Preliminary Geotechnical Report for Concrete Safety Barrier-Location 2, by OGDS2 dated April 21, 2010.

5.2 Exploration

Six exploratory borings were conducted on 07/27/2010 and 07/28/2010 along the barrier alignment. The soil borings were advanced into the ground up to a maximum depth of 16.5 feet utilizing a mechanically driven one-inch diameter Soil Probe. Blow counts were recorded at 5-feet intervals. Soil samples were visually classified in the field. No laboratory testing of soil or rock samples was conducted. Descriptions of the subsurface soils encountered as well as stations and offsets of the boring locations are presented in the attached boring records.

In addition to the above 6 borings, 11 exploratory borings were conducted between 01/20/2009 and 01/22/2009 along the barrier alignment. The soil borings were advanced into the ground up to seven feet below existing ground surface utilizing a hand auger. No boring records were prepared for these borings; however, description of the subsurface soils encountered is presented in Table 1.

Soil borings were not advanced into rock. Description of the character of the bedrock encountered was based on observation of rock outcrops in the project area.

A conventional drill rig was not used at this site because traffic control lane closure to facilitate exploration was judged to be impractical. It was determined that subsurface conditions could be accurately characterized by the exploration methods employed.

The approximate boring locations are shown on Figure 1.

6.0 GEOLOGY

Within the project area SR-78 traverses the northern margin of a small alluvial valley formed by the east-west trending Buena Vista Creek. The main valley bottom and smaller tributary valleys

are underlain by relatively young alluvial soils. The adjacent hilly topography is composed of much older sedimentary formation and granitic rock. The freeway alignment traverses over all three geologic units; therefore, all three geologic units will be encountered in project excavations. The geologic units are described below:

Quaternary Alluvium
Weakly consolidated silt, clay, sand, and gravel. These are relatively young stream deposited sediments overlay irregular surfaces of both Santiago Formation and Granitic Bedrock.
Santiago Formation
Light-colored fine to medium grained weakly indurated sandstone, often containing landslide-prone siltstone and claystone. This marine deposited sedimentary unit overlays an irregular surface of granitic bedrock.

Green Valley Tonalite
Igneous granitic bedrock with fine-grained crystals. The bedrock is often highly weathered and decomposed. Contains abundant zones of fresh and variably fractured hard rock.

7.0 GEOTECHNICAL CONSIDERATIONS

The following subsections describe geotechnical characteristics of the project site that may influence preliminary design:

7.1 Groundwater

The groundwater table is located at a significant depth relative to the proposed construction and consequently is not anticipated to impact the project.

7.2 Erosion

Existing slopes appear stable against erosion. However it is anticipated that slopes will be graded during construction. Newly graded slopes will be subject to erosion.

7.3 Seismic Hazards

The proposed project features will not be adversely impacted by seismic events.

7.4 Slope Stability and Rockfall

Slopes in soil are stable at an inclination of 2:1(H:V). Slopes in rock and formation are stable at an inclination of 2:1 and are likely to be stable at steeper inclinations.

Rockfall potential does not exist on the project.

7.5 Excavation Characteristics

Alluvium, sedimentary formation, and decomposed granitic rock may be excavated using conventional excavation and augering equipment. Zones of fractured and variously weathered to fresh hard rock will require significantly greater effort to excavate. At hard rock zones, more vigorous excavation methods are likely to include an excavator equipped with a rock breaker and track mounted air percussion drilling. The anticipated depths to rock material as well as rock descriptions are presented in Table 2. It is not anticipated that soil caving will adversely impact barrier foundation construction.

7.6 Embankments

No significant embankment will be placed as part of the project.

7.7 Volumetric Stability of Embankment and Sub grade Materials

Significant adverse soil conditions such as expansive or collapsible soils were not identified within the project limits.

7.8 Potential Geologic Hazards

No significant geologic hazards were identified within the project area.

8.0 HAZARDOUS WASTE POTENTIAL

A hazardous waste site evaluation is beyond the scope of this report. No potentially hazardous waste was encountered during site reconnaissance and site subsurface investigation.

9.0 RECOMMENDATIONS AND CONCLUSIONS

9.1 Concrete Barriers

Two types of Caltrans Standard Plan concrete barriers, Type 60 and Type 736 SV, are recommended for use at the station intervals shown in Table 3. The recommended concrete barriers and relevant design parameters are presented in the table. The pile length "L", pile spacing "S", and depth to bottom of the barrier "He" correspond to dimensions shown in Caltrans Standard Plans pages B15-6 through B15-8. "He" is estimated as a minimum of one foot.

Type 60 concrete barrier is recommended where there is little to no grade difference between the frontage roads and freeway.

Where there is a grade difference between the adjacent roadways, Type 736 SV barrier should be used. Even though the Standard Plans Type 736 SV barrier is designed to support a soundwall, it may be used for this application where there is no soundwall. The length of the piles has been

reduced to 7 feet (See Table 3) as a modification to the pile lengths shown on the Standard Plans. The reason for this is the barrier will not be supporting a soundwall and the presence of granitic rock and sedimentary formation at some locations will provide increased lateral resistance. In cases where the grade difference is less than 4 feet and the slope inclination is 2:1 (H:V) or flatter, piles may be eliminated. In that case, "He" should be increased to 4 feet as shown in Table 3.

9.2 Erosion Control

Appropriate erosion control measures should be implemented to protect the newly graded slope faces.

9.3 Surface Drainage

Concentrated surface water should not be allowed to pond behind the concrete barriers. Concentrated runoff should not be directed to drain over the slopes. Surface water should be contained by appropriate drainage improvements.

9.4 Construction Advisories

The contractor should anticipate difficult drilling conditions as described in section 7.5 and as defined in Table 2.

10.0 DIFFERING SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and location that have been provided by District 11 Design. If any conceptual changes are made during final project design or if site conditions are encountered during construction that are believed to differ from those conveyed in this report, staff from OGDS2 should review the project to provide appropriate recommendations. Any questions regarding the above recommendations should be directed to the attention of Ali Lari, (858) 467-6922 or Brian Hinman, (585) 467-4051 at OGDS2.

Table 1

Subsurface Soil Description

Boring Number	Location and Station	Soil Description
HA-09-111	2 239+00	At surface: Silty Sand (SM), medium dense, brown, fine grained. (Fill) At 5 feet: End of drilling.
HA-09-110	3 255+00	At surface: Clayey Sand (SC), loose, brown, moist, (Fill) At 3 feet depth: Fat Clay, stiff, black, high plasticity (Alluvium) At 5 feet depth: Silty Sand (SM), dense, light brown, moist. End of drilling.
HA-09-109	4 269+40	At surface: Clayey Sand (SC), loose, brown, moist, (Fill) At 2 feet depth: becomes medium dense At 4 feet depth: Sandy Clay (CL), medium stiff, brown (Alluvium) At 5 feet depth: Fat Clay, stiff, black, high plasticity At 7feet depth: Poorly-graded Sand, dense, light brown, fine-grained. End of drilling.
HA-09-108	4 295+00	At surface: Fat Clay, stiff, black, moist, high plasticity (Alluvium) At 6 feet depth: Siltstone. End of drilling.
HA-09-107	4 297+00	At surface: Silty Sand (SM), loose, reddish brown, moist, fine grained (Fill) At 2 feet depth: becomes dense At 4 feet depth: Igneous rock. End of drilling.
HA-09-106	4 298+00	At surface: Silty Sand (SM), loose, reddish brown, moist, fine-grained, (Fill) At 2 feet depth: becomes dense At 3 feet depth: Igneous rock End of drilling.
HA-09-105	4 300+00	At surface: Silty Sand (SM), medium dense, reddish brown, moist, fine-grained At 3 feet depth becomes dense, At 5 feet depth: Igneous rock End of drilling.
HA-09-104	4 302+00	At surface: Silty Sand (SM), loose, reddish brown, moist, fine-grained, (Fill) At 1 foot depth becomes dense At 5 feet depth: Igneous rock End of drilling.

Boring Number	Location and Station	Soil Description
HA-09-103	4 311+00	At surface: Poorly graded Sand (SP), loose, light brown, moist. At 1 foot depth: Igneous rock End of drilling
HA-09-102	4 312+00	At surface Poorly graded Sand (SP), loose, gray, moist, Fine-grained, (Fill) At 2 feet depth: becomes dense At 4.5 feet: Igneous rock End of drilling.
HA-09-101	4 331+00	At surface: Poorly graded Sand (SP), loose, dark gray, moist, fine-grained, (Fill) At 2 feet depth: Sandy Silt (ML), medium dense, reddish brown, moist, (Alluvium) At 6 feet depth: Encountered hard ground. End of drilling.

Table 2

Approximate Depths to Rock

BEGIN STATION	END STATION	Depth to ROCK (feet)	ROCK DESCRIPTION
229+00	293+00	>8	Sedimentary rock, Siltstone poorly indurated
293+00	295+00	8	Sedimentary rock, Siltstone poorly indurated
295+00	298+00	4	Igneous rock, fractured, Moderately weathered to fresh
298+00	300+00	5	Igneous rock, fractured, Moderately weathered to fresh
300+00	307+00	3	Igneous rock, fractured, Moderately weathered to fresh
307+00	320+00	2	Igneous rock, fractured, Moderately weathered to fresh
320+00	326+00	3	Igneous rock, fractured, Moderately weathered to fresh
326+00	335+00	>8	Igneous rock, fractured, Moderately weathered to fresh

Table 3

Recommended Concrete Barriers

Location	Begin Station	End Station	Barrier Type	Pile Length (L) Feet	(He) Feet	(S) Feet
2	229+00	240+80	736SV	-	4	-
2	240+80	245+40	60	-	-	-
2	245+40	252+00	736SV	-	4	-
				-	-	-
3	246+20	259+00	736SV	-	4	-
				-	-	-
4	270+00	271+60	736SV	7	1	10
4	271+60	274+60	736SV	-	4	-
4	274+60	291+40	60	-	-	-
4	291+40	294+00	736SV	-	4	-
4	294+00	305+00	736SV	7	1	10
4	305+00	305+60	736SV	-	4	-
4	305+60	309+60	60	-	-	-
4	309+60	310+40	736SV	-	4	-
4	310+40	319+40	736SV	7	1	10
4	319+40	320+60	736SV	-	4	-
4	320+60	326+00	60	-	-	-
4	326+00	328+20	736SV	-	4	-
4	328+20	335+40	736SV	7	1	10

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HD-10-117
A. Lari	07/28/10	07/28/10	NA	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans Drilling Services			247+00, 77 feet Lt. 78SD1	236.5 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Hand driven (Soil Probe)			Wacker WM 80	1.5"
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
1"			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Cuttings			READINGS Not Encountered	Not encountered	15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
282.8	0		SILTY SAND (SM), estimated medium dense, light brown, dry, fine SAND												
	1														
	2														
	3														
	4														
277.8	5	5.0	SILTY SAND to poorly graded SAND (SM-SP), loose, gray with yellow mottled, dry, fine SAND			35									
						35									
	6					38	73								
	7														
	8														
	9														
	10		.....slightly compacted			24									
						34									
271.3	11	11.5				82	116								
	12		SEDIMENTARY ROCK (SILTSONE), poorly indurated, gray												
	13														
	14														
267.3	15	15.5					Ref								
			Bottom of the borehole at 15.5 feet. Boring terminated at planned depth.												
	16														
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION	REPORT TITLE GDR for Concrete Barrier				HOLE ID: HD-10-117
DIVISION OF ENGINEERING SERVICES	DISTRICT COUNTY	ROUTE	POSTMILE(KP)	EA	
	11 SD	78	3.3/5.8	294501	
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME NA				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER Concrete Barrier	PREPARED BY A. Lari	DATE 08/03/10	SHEET 1 of 1	

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HD-10-116
A. Lari	07/28/10	07/28/10	NA	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans Drilling Services			294+00, 78 feet LL 78SD1	268.6 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Hand driven (Soil Probe)			Wacker WM 80	1.5"
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
1"			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING Not Encountered; AFTER DRILLING (DATE) Not encountered	TOTAL DEPTH OF BORING
Cuttings				15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
262.8	0		SILTY SAND (SM), estimated medium dense, light brown, dry, fine SAND												
	1														
	2														
	3														
	4														
277.8	5	5.0	SILT (ML), loose, gray, dry			14									
	6					16									
						38	54								
	7														
	8														
	9														
272.8	10	10.0	SEDIMENTARY ROCK (SILTSONE), poorly indurated, gray			36									
	11					52									
						80	132								
	12														
	13														
	14														
267.3	15	15.5					Ref								
	16		Bottom of the borehole at 15.5 feet. Boring terminated at planned depth.												
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE				HOLE ID:	HD-10-116
GDR for Concrete Barrier					
DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA	
11	SD	78	3.3/5.8	294501	
PROJECT OR BRIDGE NAME					
NA					
BRIDGE NUMBER	PREPARED BY	DATE	SHEET		
Concrete Barrier	A. Lari	08/03/10	1 of 1		

LOGGED BY: A. Lari	BEGIN DATE: 07/28/10	COMPLETION DATE: 07/28/10	BOREHOLE LOCATION (Lat/Long or North/East and Datum): NA
HOLE ID: HD-10-115			
DRILLING CONTRACTOR: Caltrans Drilling Services			BOREHOLE LOCATION (Station, Offset, and Line): 298+00, 85 feet Lt. 78SD1
SURFACE ELEVATION: 282.8 ft			
DRILLING METHOD: Hand driven (Soil Probe)			DRILL RIG: Wacker WM 80
BOREHOLE DIAMETER: 1.5"			
SAMPLER TYPE(S) AND SIZE(S) [ID]: 1"			SPT HAMMER TYPE: NA
HAMMER EFFICIENCY (ER_i): NA %			
BOREHOLE BACKFILL AND COMPLETION: Cuttings			GROUNDWATER READINGS: DURING DRILLING Not Encountered; AFTER DRILLING (DATE) Not encountered
TOTAL DEPTH OF BORING: 5.5 ft			

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 In	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
282.8	0		SILTY SAND (SM), estimated medium dense, reddish brown, dry, fine SAND												
	1														
	2														Hard ground, very slow advancement.
	3														
	4														
277.8	5	5.0													Hard layer, no advancement, moved the hole 10 feet toward West, the condition remained the same.
			Fractured IGNEOUS ROCK, gray				Ref								
277.3	5.5		Boring terminated at 5.5 feet.												
	6														
	7														
	8														
	9														
	10														
	11														
	12														
	13														
	14														
	15														
	16														
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: GDR for Concrete Barrier

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	SD	78	3.3/5.8	294501

PROJECT OR BRIDGE NAME: NA
BRIDGE NUMBER: Concrete Barrier
PREPARED BY: A. Lari
DATE: 08/03/10
SHEET: 1 of 1

HOLE ID: HD-10-115

LOGGED BY: A. Lari	BEGIN DATE: 07/27/10	COMPLETION DATE: 07/27/10	BOREHOLE LOCATION (Lat/Long or North/East and Datum): NA	HOLE ID: HD-10-114
DRILLING CONTRACTOR: Caltrans Drilling Services			BOREHOLE LOCATION (Station, Offset, and Line): 302+00, 90 feet Lt. 78SD1	SURFACE ELEVATION: 284.4 ft
DRILLING METHOD: Hand driven (Soil Probe)			DRILL RIG: Wacker WM 80	BOREHOLE DIAMETER: 1.5"
SAMPLER TYPE(S) AND SIZE(S) [ID]: 1"			SPT HAMMER TYPE: NA	HAMMER EFFICIENCY (ER_i): NA %
BOREHOLE BACKFILL AND COMPLETION: Cuttings			GROUNDWATER READINGS: DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not encountered	TOTAL DEPTH OF BORING: 3.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
284.4	0		SILTY SAND (SM), estimated medium dense, reddish brown, dry, fine SAND												
	1														
	2														
281.9		2.5													Hard ground, no advancement, moved the hole 10 feet, 30 feet and another 30 feet toward West, the condition remained the same.
			Fractured IGNEOUS ROCK, gray												
281.4	3	3.0													
			Boring terminated at 3 feet.												
	4														
	5														
	6														
	7														
	8														
	9														
	10														
	11														
	12														
	13														
	14														
	15														
	16														
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: GDR for Concrete Barrier

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	SD	78	3.3/5.8	294501

PROJECT OR BRIDGE NAME: NA

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
Concrete Barrier	A. Lari	08/03/10	1 of 1

HOLE ID: HD-10-114

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HD-10-113
A. Lari	07/27/10	07/27/10	NA	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans Drilling Services			316+00, 76 feet Lt. 76SD1	302.8 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Hand driven (Soil Probe)			Wacker WM 80	1.5"
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
1"			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not encountered	TOTAL DEPTH OF BORING
Cuttings				6.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
302.8	0		SILTY SAND (SM), estimated medium dense, light brown, dry, fine SAND												
	1														
300.3	2	2.5	IGNEOUS ROCK, moderately weathered to fresh, gray												Hard ground, very slow advancement
			Boring terminated at 2.5 feet.												
	3														
	4														
	5														
	6														
	7														
	8														
	9														
	10														
	11														
	12														
	13														
	14														
	15														
	16														
	17														
	18														
	19														
	20														

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GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
GDR for Concrete Barrier

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	SD	76	3.3/5.8	294501

PROJECT OR BRIDGE NAME
NA

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
Concrete Barrier	A. Lari	08/03/10	1 of 1

HOLE ID: HD-10-113

LOGGED BY: A. Lari	BEGIN DATE: 07/27/10	COMPLETION DATE: 07/27/10	BOREHOLE LOCATION (Lat/Long or North/East and Datum): NA	HOLE ID: HD-10-112
DRILLING CONTRACTOR: Caltrans Drilling Services			BOREHOLE LOCATION (Station, Offset, and Line): 327+70, 76 feet Lt. 78SD1	SURFACE ELEVATION: 299.0 ft
DRILLING METHOD: Hand driven (Soil Probe)			DRILL RIG: Wacker WM 80	BOREHOLE DIAMETER: 1.5"
SAMPLER TYPE(S) AND SIZE(S) [ID]: 1"			SPT HAMMER TYPE: NA	HAMMER EFFICIENCY (ER_i): NA %
BOREHOLE BACKFILL AND COMPLETION: Cuttings			GROUNDWATER READINGS: DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not encountered	TOTAL DEPTH OF BORING: 16.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
299.0	0		SILTY SAND (SM), estimated medium dense, light brown, dry, fine SAND												
	1														
	2														
	3														
	4														
	5		.....loose, olive gray			18									
	6					36									
						40	76								
	7														
	8		.....light brown, moist												
	9														
	10		.....slightly compacted, brown, moist			18									
	11					40									
287.5		11.5				70	110								
	12		Fat CLAY(CH), estimated stiff, brown, moist, high plasticity												
	13														
	14														
284.0	15	15.0													
			SILTY SAND (SM), slightly compacted, light brown, moist, fine SAND			44									
	16					52									
282.5		16.5				65	117								
	17		Bottom of the borehole at 16.5 feet. Boring terminated at planned depth.												
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: GDR for Concrete Barrier				HOLE ID:	HD-10-112
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: SD	ROUTE: 78	POSTMILE(KP): 3.3/5.8	EA: 294501	
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: NA					
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: Concrete Barrier	PREPARED BY: A. Lari	DATE: 08/03/10	SHEET: 1 of 1		

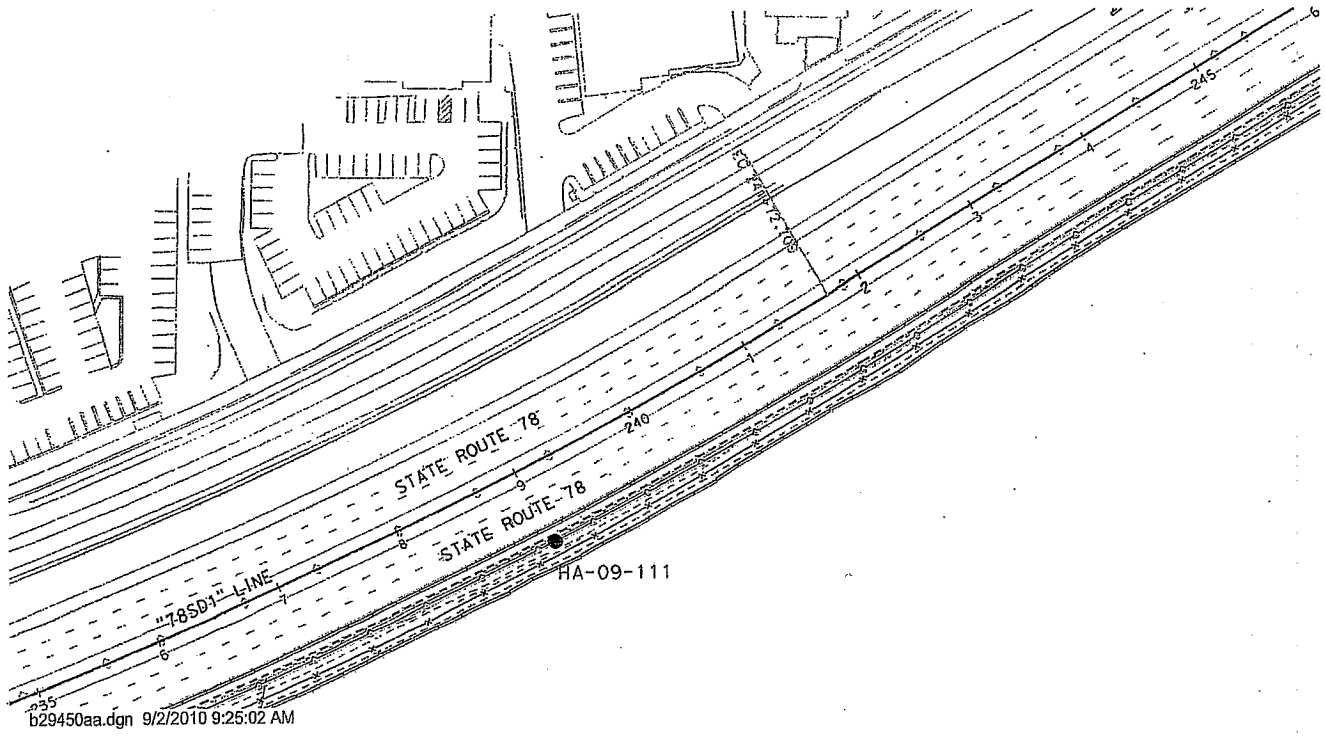


Figure 1

11-SD-78-3.3/5.9 1100000387

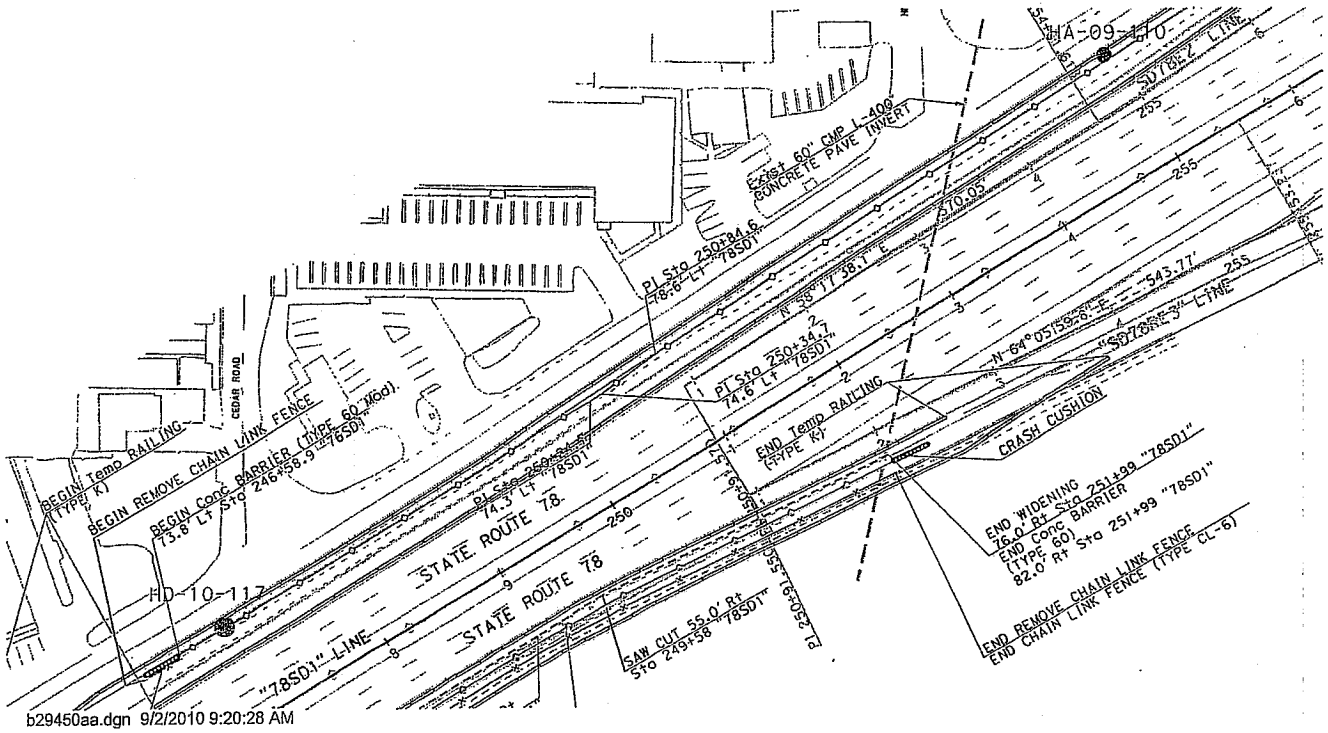
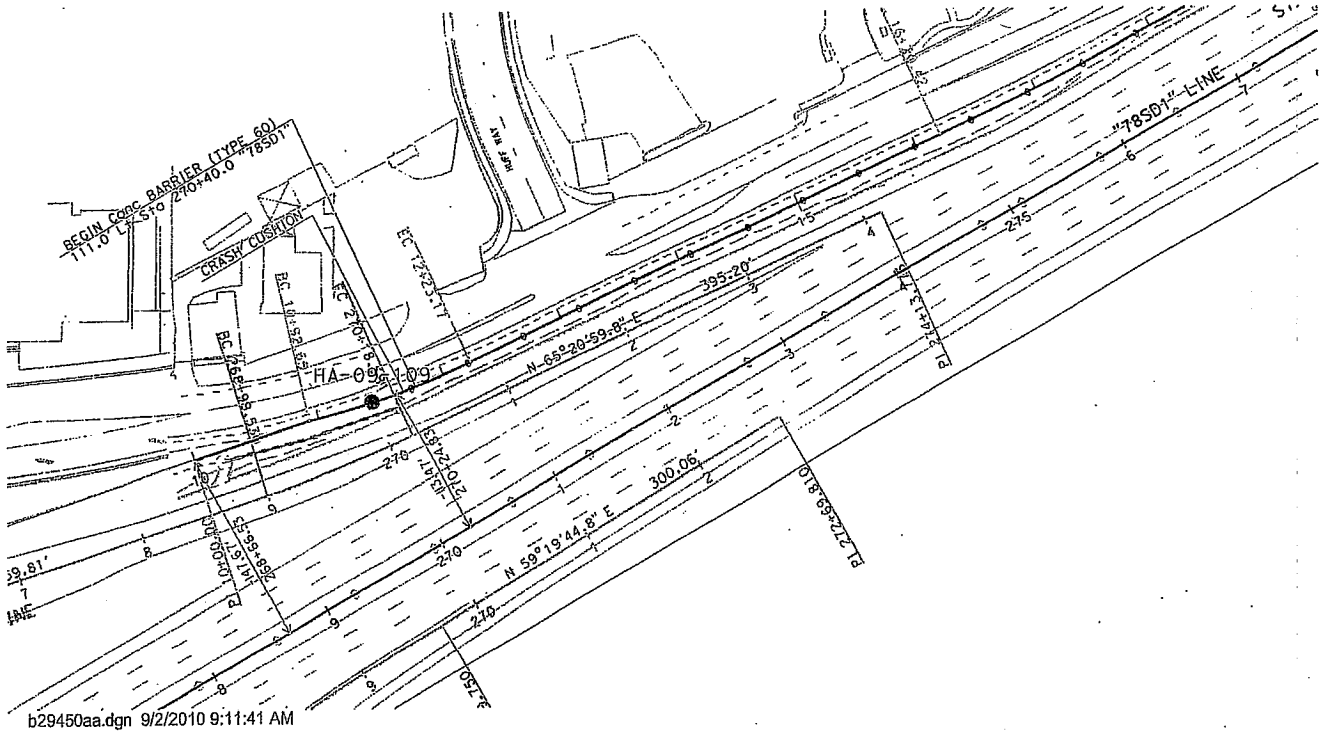


Figure 1

11-SD-78-3.3/5.9 1100000387



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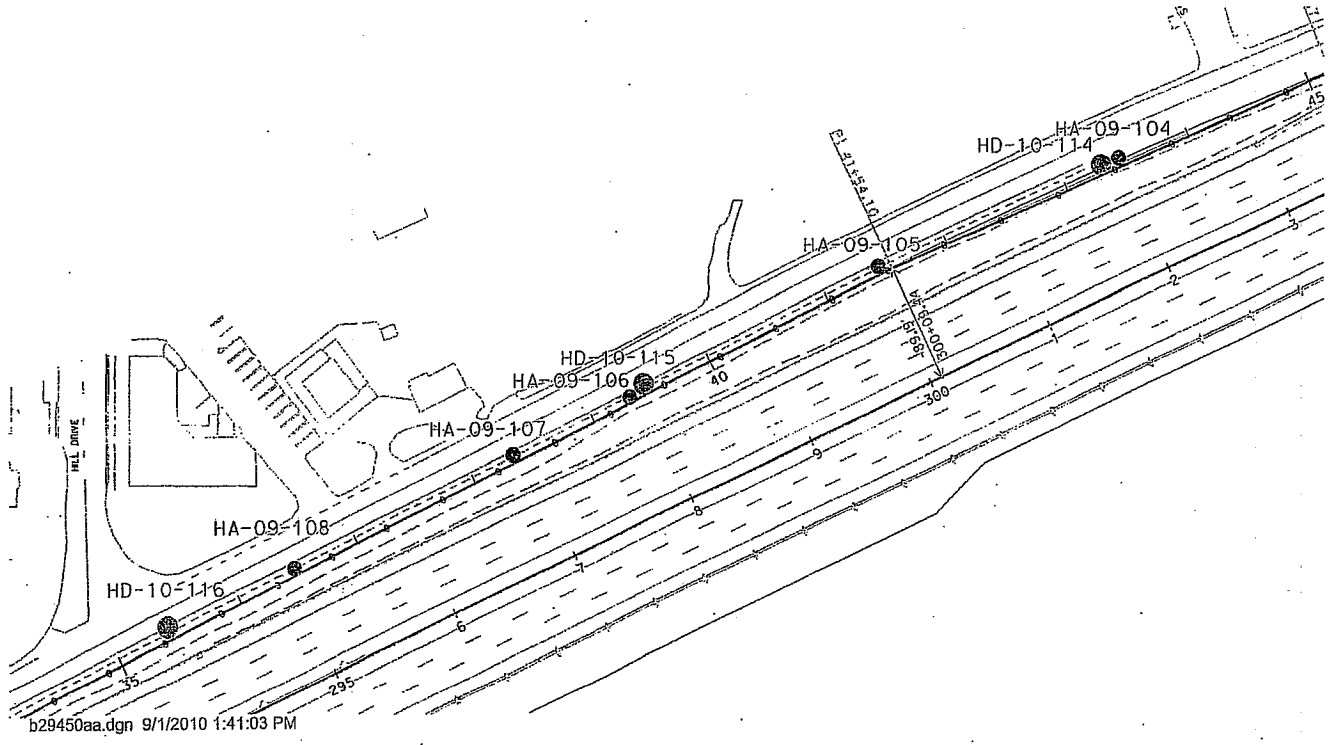

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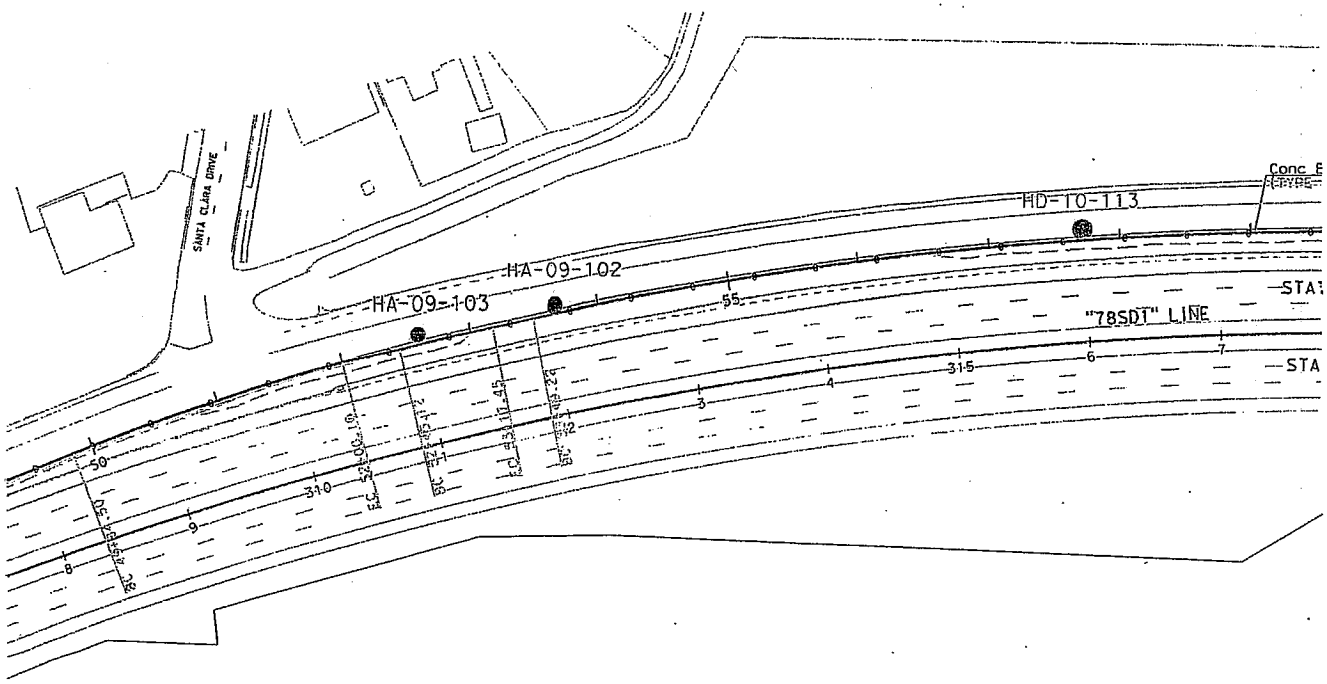

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11-SD-78-3.3/5.9 1100000387

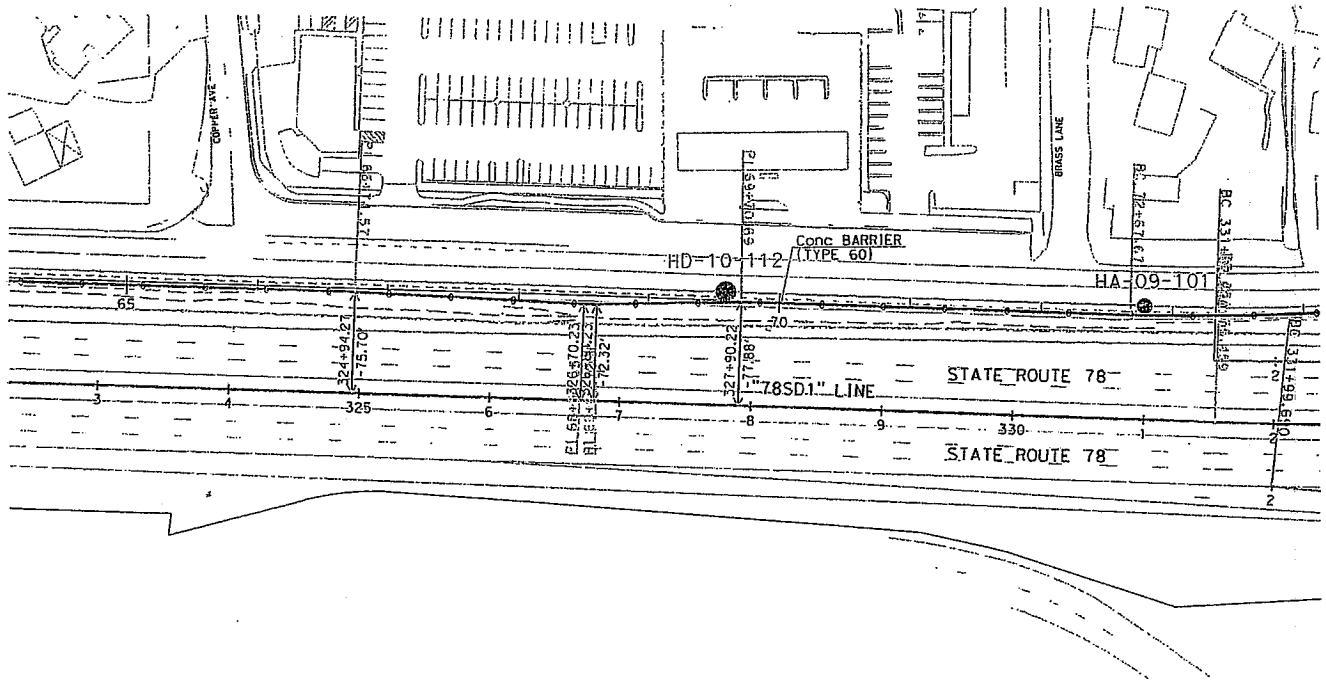

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Figure 1

11-SD-78-3.3/5.9 1100000387